Nov. 13, 1956 R. C. JAYE 2,769,981

CONDENSATE INHIBITING LINER FOR TOILET FLUSH TANKS

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Fig. 1.

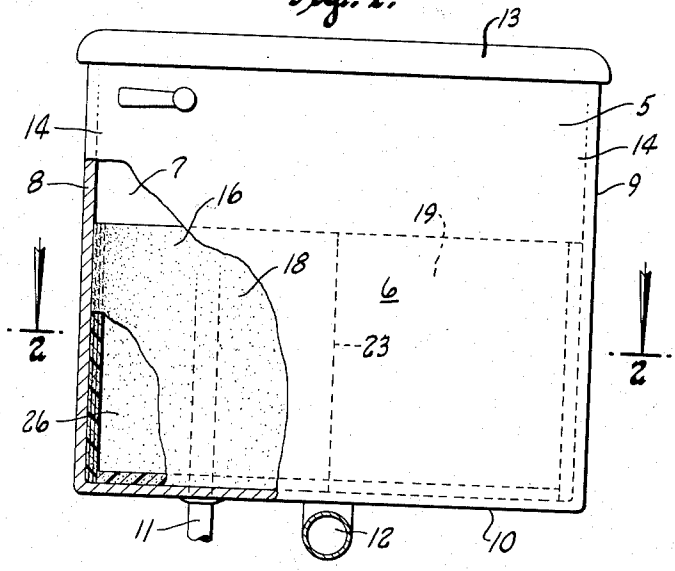


Fig. 2.

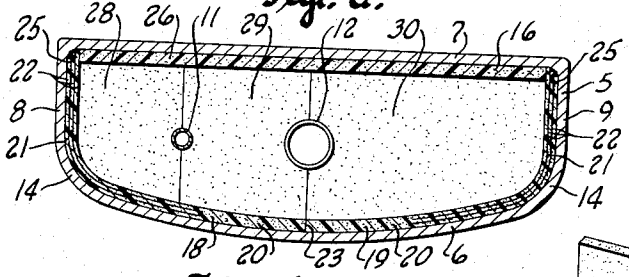


Fig. 3.

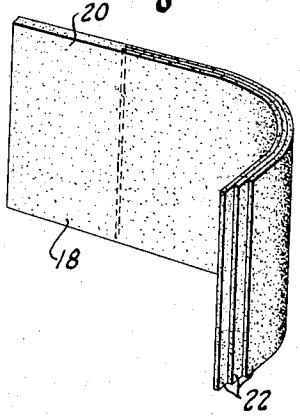
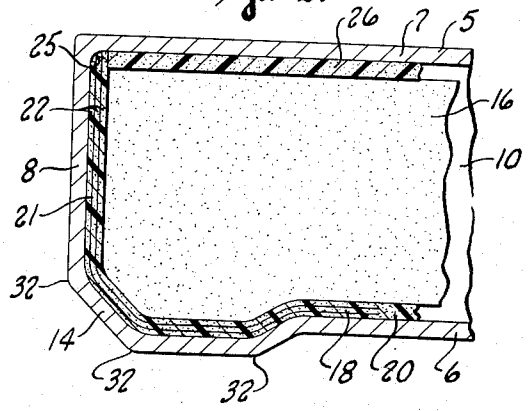


Fig. 4.



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CONDENSATE INHIBITING LINER FOR TOILET FLUSH TANKS

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3 Claims. (Cl. 4—18)

This invention relates to flush tanks such as are used in toilet installations and has more specific reference to the provision of means for effectively and permanently inhibiting the condensation of moisture on the exterior surfaces of the flush tank.

Through sweating of toilet flush tanks on warm or humid days has long been a source of annoyance and frequently a cause of damage to bathroom floors, no one heretofore has been able to devise a thoroughly reliable and permanent solution to this problem.

Such expedients as drip trays attached to the underside of flush tanks to catch condensate dripping therefrom served to prevent the condensate from collecting on the bathroom floor, but were found to be objectionable in that the fittings by which there were attached to the piping at the underside of the tank were prone to rust, and when this occurred led to rusting of the piping which supported the trays. This piping has a highly polished plated surface, and when it became rusted in the manner described was unsightly to say the least.

Another objection to the use of drip trays was that they frequently failed to discharge all the condensate collected therein into the toilet bowl with the result that unpleasant odors became noticeable when such condensate stood for a period of time in the trays. This is particularly true of those types of drip trays in which blocks of porous water absorbent material were laid in the bottom of the pan to soak up condensate collected therein for the purpose of dissipating the same to the atmosphere during periods when little or no condensate formed upon the surfaces of the flush tank.

Another attempt to solve this condensation problem entailed the application of an absorbent fabric covering to the exterior surfaces of the tank; the purpose of the covering being to soak up any condensate which formed on the tank and to dissipate such moisture to the atmosphere during periods of non-use of the tank.

This expedient, though somewhat better than the drip tray, was nevertheless objectionable especially on hot, humid days during which the fabric covering tends to become saturated with condensate and is usually unable to dissipate the same to the atmosphere. This condition also leads to the generation of odors if the covering is not changed frequently, and is the cause of mildewing of the fabric which, of course, is intolerable.

In both cases described, therefore, the frequent attention required by such past expedients as dip trays and fabric exterior covers for flush tanks was as much a deterrent to their widespread use as the more serious objections referred to above.

It is an object of this invention, therefore, to provide a condensate inhibiting insulator for toilet flush tanks which may be permanently installed thereon, yet which has none of the objections inherent in the conventional drip trays or fabric outer coverings previously offered as solutions to the problem of toilet tank sweating.

More specifically it is a purpose of this invention to provide a novel insulating liner which may be readily

and permanently installed in the interior of a toilet flush tank, in close contact with the wall surfaces thereof, to not only prevent the circulation of cold water across the inner surfaces of the tank but to actually preclude contact of the water with the tank.

Inasmuch as a heat insulating liner of the character described should be relatively light in weight, inexpensive, and easy to cut and fit to the widely varying shapes of present day toilet flush tanks, it is another feature of this invention to provide panels of an exceptionally lightweight cellular material of the type known as styrene foam, from which the liner may be readily made. Such material may be easily cut to any length or shaped to fit any outline of the tank cross section, but two of the characteristics of this material which hitherto limited its use are its brittleness and the fact that its rigidity increases with the thickness thereof.

It is another object of this invention, therefore, to provide a novel panel of cellular material such as styrene foam which may be used for heat insulating purposes, and having a thickness which normally renders the panel substantially rigid, but which has one end portion thereof laminated with the laminations together comprising the thickness of the panel and individually flexible so as to be capable of being bent around the corners of a toilet flush tank.

With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawing illustrates two complete examples of the physical embodiments of the invention constructed according to the best modes so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a front elevational view of a conventional toilet flush tank having portions thereof broken away and shown in section to illustrate the application of this invention thereto;

Figure 2 is a sectional view taken through Figure 1 along the plane of line 2—2;

Figure 3 is a perspective view of an insulating panel made in accordance with this invention; and

Figure 4 is a fragmentary sectional view illustrating a slightly modified embodiment of the invention.

Referring now more particularly to the accompanying drawing in which like reference characters indicate like parts, the numeral 5 designates a toilet flush tank of conventional construction having front and back walls 6 and 7, respectively, opposite side walls 8 and 9 extending between the front and back walls, and a bottom wall 10 closing the bottom of the tank. Holes provided in the bottom wall accommodate a water supply pipe 11 and a discharge pipe 12. The usual removable cover 13 closes the open top of the tank.

Though toilet flush tanks vary widely in size and cross sectional shapes, some having nearly square upright corners and flat front walls while others have rounded front corners and curved front walls, the condensate inhibiting liner 16 of this invention is applicable to all such tanks regardless of their size or cross sectional shape.

By way of illustration, the liner of this invention has been shown applied to a flush tank having generously rounded upright front corners 14 and a front wall 6 having relatively large radius curvature, so that the front portion of the tank may be said to be semi-elliptical.

The liner 16 comprises a number of panels covering the inner surfaces of the tank, and comprising lightweight

cellular heat insulating material preferably of plastic such as that commonly known as styrene foam. Aside from its light weight and low cost, this material has the further advantage of being impervious to water; and in the present case the panels are used as water-proof barriers between the water in the tank and the inner surfaces of the tank walls which would otherwise be in direct contact with the water.

While the heat insulating qualities of styrene foam are well known, this material has had characteristics which hitherto constituted a deterrent to its widespread use for heat insulating purposes. Panels or other pieces of styrene foam are relatively brittle and have a rigidity which increases with their thickness. In other words, in the past it was impossible to bend panels or other pieces of this material around corners to conform them to the shape of an object to be covered.

According to this invention, however, those portions of the paneling which cover the inner surfaces of the side walls and adjoining portions of the front wall of the flush tank are specifically constructed to enable the same to be readily bent around the upright corners **14** of the tank without danger of breaking the paneling or reducing the thickness thereof.

As shown best in Figure 2, two complementary panel sections **18** and **19** are employed to cover the inner surfaces of the front and side walls of the tank. Each of these panel sections has a solid end portion **20** and a laminated portion **21** at its other end. In the present case, with panels of approximately one-half inch thickness, two spaced cuts are made in one end portion of each panel parallel to the opposite faces thereof to define three laminations **22** of equal thickness, and having a length substantially greater than the width of the side walls **8** and **9** of the tank so that the laminae will reach from an area well inwardly of the adjacent upright front corner of the tank around said corner and rearwardly across the entire width of the adjacent side wall of the tank. The free ends of the laminae, of course, lie closely adjacent to the inner surface of the back wall **7** of the tank.

It is to be understood that the complementary panel sections **18** and **19** are identical, and that their solid portions **20** preferably abut or otherwise meet one another along the vertical centerline of the front wall of the tank to form a butt joint as indicated at **23**. The thinness of the laminations, of course, render them independently flexible in contrast to the relatively rigid and brittle solid portion **20** of each panel. Hence, the laminated end portions of the paneling may be readily bent around the upright corners of the tank, as illustrated in Figure 2, to conform to the curvature thereof.

Particular attention is directed to the fact that the bending of the laminated end portions of the front and side wall forming panels **18** and **19** diminishes the lengths of the laminations to different degrees. The laminations which lie on the insides of the curves are longest, while those on the outsides of the curves are the shortest. This characteristic of the invention is employed to advantage, for as shown in Figure 2 the stepped outer ends of the laminations nicely nest themselves in the curved corners or fillets **25** at the junctions of the side and back walls of the tank.

In order to provide paneling in kit form for use with toilet tanks of any size or shape, front and side wall forming panels **18** and **19** may be made up to a length somewhat in excess of that needed for the average size tank. In most cases this will necessitate fitting the complimentary panel sections **18** and **19** into the tank, abutting the free ends of the laminations of each panel in the fillets **25** at the rear corners of the tank and allowing their solid end portions **20** to overlap on the front wall of the tank. While the panels are held in this position, with their laminated end portions flexed around the front corners of the tank, the solid end portions of the panels may be marked and then cut with a knife or sawed to form the butt joint **23**. Thereafter a back wall panel **26** may next be installed in the tank covering the inner surfaces of the back wall **7** and confined lengthwise between the stepped end portions of the panel laminations. In this manner the stepped ends of the laminations are held nested in the fillets **25** at the rear corners of the tank by the back panel **26**.

Three panel sections **28**, **29** and **30**, each extending from the front to the rear of the tank, cooperate to cover the bottom wall **10** of the tank. The center panel section **29** occupies the space between the water supply pipe **11** and the outlet fitting **12**, and has semi-circular notches cut in its opposite side edges to fit around one-half of these fittings. The sections **28** and **30** on either side of the center section **29** have straight edges which abut the opposite straight edges of the center section and which are likewise notched to accommodate the remaining halves of the fittings **11** and **12**; and their edge portions which lie adjacent to the front and side walls of the tank are cut or shaped to correspond to the curvature thereof.

While it is optional as to whether the three bottom sections **28**, **29** and **30** may cover the entire bottom of the tank right up to the junctions between its bottom and upright walls, they have been shown confined between the lower edges of the panels **18**, **19** and **26** which cover the upright walls of the tank. In this manner, the bottom panel sections serve to hold the front and side wall forming panels as well as the back wall panel in place in the tank.

It is to be understood, of course, that as long as the installation described serves to largely prevent water in the tank from contacting or circulating over the walls of the tank, securement of the panels to the tank walls is unnecessary, and the main object of preventing condensation of moisture on the exterior of the tank will be accomplished.

However, for the most advantageous use of the styrene foam paneling of this invention, the panel sections may be adhered to the inner surfaces of the tank walls which they overlie and cemented together at the joints therebetween, using an asphalt chemically setting adhesive such as that sold under the trade name "Enamelite," or any good water proof linoleum cement. When cemented in place and with the panels extending upwardly a distance beyond the normal level of water in the tank the liner provides a water proof barrier having especially good heat insulating characteristics. Needless to say, this invention, therefore, provides a permanent condensation inhibiting liner which once installed in the tank needs no further attention.

The ease with which the styrene foam panels may be cut to fit all different types of toilet flush tanks makes it a simple matter for the average home owner to install the liner of this invention in a toilet flush tank. However, if desired, the paneling may also be permanently installed in toilet flush tanks at the time of their manufacture.

One of the most important features of this invention, of course, resides in the provision of front and side wall forming panels which have a substantial length thereof laminated so that they may be readily bent around corners of even small radius. The conformability of the laminated end portions of the panels to the various corner shapes of toilet flush tanks is suggested in Figure 4, which shows a corner portion of a modern tank having what may be considered three relatively short radius curves **32** at each upright front corner thereof. The fact that the laminations **22** are but a fraction of the thickness of the solid portion **20** of the panel of which they form an integral part enables them to be bent around the curves **32** without any danger of the laminations cracking or breaking, as would be the case if it was attempted to bend the solid portion **20** around similar curves.

From the foregoing description taken together with

the accompanying drawing, it will be readily apparent to those skilled in the art that this invention provides a permanent solution to the problem of toilet tank condensation, enabling even unskilled householders to avail themselves of the advantages of this invention at low cost and with a minimum of effort.

What I claim as my invention is:

1. A heat insulating liner for the interior of a toilet flush tank, characterized by: complementary panel sections each covering one side wall and substantially one-half of the front wall of the tank from the bottom thereof to a level higher than the normal level of water in the tank, each of said panel sections being of cellular plastic material having good heat insulating characteristics and the rigidity of which increases with the thickness thereof, said panel sections having a thickness which normally renders them substantially rigid and incapable of being bent around corners, and each having a solid portion which edgewise meets that of the other panel section substantially at a central zone of the front wall of the tank, and an end portion consisting of a plurality of substantially thin independently flexible laminations flatwise overlapping one another and together comprising the thickness of the panel section, the inner portions of said laminations being integrally joined to the solid portion of the panel section and overlying portions of the front wall of the tank inwardly from the adjacent upright corner of the tank, said laminations on both panel sections being of the same length and being bent around the upright front corners of the tank to substantially conform to the shape thereof and closely overlying and covering the interior surfaces of the side walls of the tank with their free ends contiguous to the back wall of the tank; further characterized by the provision of a back wall panel of similar cellular heat insulating material, flatwise overlying the inner surface of the back wall, and confined lengthwise between the free end portions of the laminations of said complementary panel sections to hold said end portions thereof in the rear upright corners of the tank; further characterized by the provision of panelling of similar cellular heat insulating material flatwise overlying the inner surface of the bottom wall of the tank and confined between the lower edge portions of the back, front and side wall panelling to hold said back, front and side wall panelling against separation from the tank walls covered thereby; and further characterized by the fact that all of said panelling is exposed at the interior of the tank.

2. A heat insulating liner for the interior of a toilet flush tank characteriezd by: a pair of similar panel sections each covering the inside surface of one side wall of the tank, an adjacent part of the front wall thereof and the upright front corner connecting said two walls from the bottom thereof to a level above the normal level of water within the tank, so that said panel sections are directly exposed to the water in the tank, each of said panel sections being of cellular plastic material having good heat insulating characteristics and the rigidity of which increases with the thickness thereof, said panel

sections having a thickness which normally renders them substantially rigid and incapable of being bent around corners, and each of said panel sections having a solid end portion overlying one of the two tank walls connected by one of said upright front corners of the tank, and a slitted end portion consisting of a plurality of substantially independent laminations flatwise overlying one another and together comprising the thickness of the panel section, said laminations being integrally joined to the solid end portion of the panel section and overlying the said corner of the tank and the adjacent other tank wall.

3. A heat insulating liner for the interior of a toilet flush tank comprising: a pair of similar panel sections each covering the inside surface of one side wall of the tank, an adjacent part of the front wall thereof and the upright front corner connecting said two tank walls from the bottom thereof to a level above the normal level of water within the tank, so that said panel sections are directly exposed to the water in the tank, each of said panel sections being of cellular plastic material having good heat insulating characteristics and the rigidity of which increases with the thickness thereof, said panel sections having a thickness which normally renders them substantially rigid and incapable of being bent around corners, and each of said panel sections having a solid end portion which overlies one of the two walls connected by one of said upright front corners of the tank, and an end portion consisting of substantially thin independently flexible laminations flatwise overlapping one another and together comprising the thickness of the panel section, said laminations being integrally joined to the solid portion of the panel section and extending endwise therefrom around the inside of said corner of the tank and over the adjacent other one of said two walls connected by the said corner of the tank; a back wall panel of similar heat insulating material, flatwise overlying the inside surface of the back wall in direct exposure to the water in the tank, the opposite ends of said back wall panel being contiguous to the adjacent ends of the portions of said pair of panel sections which overlie the side wall of the tank; and paneling of similar cellular heat insulating material flatwise overlying the inside surface of the bottom wall of the tank in direct exposure to the water in the tank with the edges thereof contiguous to the lower edge of the back wall panel and to the lower edge of said panel sections overlying the front and side walls of the tank.

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